FIXED PRICE
RESEARCH & DEVELOPMENT SUBCONTRACT

Subcontract No. SPECMEN, 10/14/03

BETWEEN

CALIFORNIA INSTITUTE OF TECHNOLOGY
JET PROPULSION LABORATORY
(The "Institute" or "JPL")
4800 OAK GROVE DRIVE
PASADENA, CALIFORNIA 91109-8099

AND

{TYPE SUBCONTRACTOR'S NAME AND ADDRESS HERE}

THIS CONTRACT FOR

MARS SCIENCE LABORATORY (MSL)

SUBSONIC PARACHUTE TECHNOLOGY TASK (SPTT)

TEST SERIES I PARACHUTES

IS A

SUBCONTRACT UNDER JPL's NASA PRIME CONTRACT

TASK ORDER NO. XXX

A DO - C9 Rating is assigned to this Subcontract under DMS Regulation 1

CONTENTS

The following documents are incorporated into and made a material part of this Subcontract.

GENERAL PROVISIONS: Fixed-Price Research and Development Contract R 8/03, with Included Exhibits.

- JPL 1737, “Release of Information” R 9/99
- JPL 2385, “Notification to Prospective Contractors of JPL's Ethics Policies and Anti-Kickback Hotline” R 7/91
- JPL 2892, “Certifications” R 8/01
- JPL 2895, “Asbestos Notification” R 9/98
- Notice of Potential Tax Withholding R 7/03

ADDITIONAL GENERAL PROVISIONS (AGPs)

New Technology R 8/01 LARGE BUSINESS

OR

Patent Rights - Retention By The Contractor (Short Form) R 4/99 SMALL BUSINESS

Security Requirements for Unclassified Automated Information Resources and Access to JPL’s Controlled Facilities R 12/01

Special Tooling R 4/99 (IF PROPOSED)

Special Test Equipment R 4/99 (IF PROPOSED)

Progress Payments R 4/99 LARGE BUSINESS

OR

Progress Payments – Small Business R 4/99 SMALL BUSINESS

PREAMBLE

This Subcontract, entered into on by and between the CALIFORNIA INSTITUTE OF TECHNOLOGY (hereinafter called the "Institute" or "JPL"), a corporation organized and existing under the laws of the State of California, and Subcontractors Name (hereinafter called the "Subcontractor"), a corporation organized and existing under the laws of the State of Subcontractors State of Incorporation and constituting a subcontract under prime contract with NASA;

WITNESSETH THAT:

The Subcontractor agrees to furnish and deliver the supplies and perform the services set forth in this Subcontract for the consideration stated herein.

SCHEDULE

ARTICLE 1. STATEMENT OF WORK AND DELIVERY INSTRUCTIONS

On or Before

1.0 The Contractor shall design, fabricate, integrate and deliver a Parachute Decelerator System (PDS) for the Mars Science Laboratory (MSL) Subsonic Parachute Technology Task. The PDS includes two primary components: the Ringsail main parachute and the drogue parachute. In performance of this effort the Contractor shall:

1.1 Design and Analysis
Perform all design and analysis necessary for fabrication and operation of the Parachute Decelerator System (PDS) in accordance with the specification given in Exhibit I.

1.1.1 Preliminary Design
Generate and document a preliminary design for the PDS to meet the requirements of the Specification. This effort shall include the following:

1.1.1.1 Design, analysis, and tradeoffs necessary to substantiate a recommended design.

1.1.1.2 Participate in weekly status teleconferences referenced in paragraph 1.6.6.3 below to establish a Mechanical Interface Control Document (ICD) and to establish a design for the release mechanisms

1.1.1.3 Present the results of the Preliminary Design to JPL for approval at the Preliminary Design Review (PDR). The PDR will be an all-day review and shall cover the following topics: — Feb. 17th, 2004

i. Preliminary design description, including material choice and geometry
ii. Tradeoff studies leading to the chosen design
iii. Preliminary inflation model
iv. Estimates of drag and stability coefficients
v. Preliminary structural analysis
vi. Preliminary trajectory analysis, including drogue/main recontact analysis
vii. Any additional information the contractor wishes to discuss

1.1.2 Detailed Design
Upon JPL approval of the preliminary design at PDR, generate and document a detailed design of the PDS. The effort shall include the following:

1.1.2.1 Refinement of tests, analysis, literature references, or computer simulations to determine performance as required.

1.1.2.2 Detail aerodynamic, mechanical, and thermal design, worst-case analysis, and tradeoffs necessary to facilitate the recommended design.

1.1.2.3 Present the results of the detailed design effort to JPL for approval at the Critical Design Review (CDR) prior to proceeding with flight test hardware fabrication and test. The CDR shall be an all day review and shall cover the following topics: — Mar. 25th, 2004

i. Closed out all action items from PDR
ii. Final design description
iii. Deployment and inflation model
iv. Drag and stability coefficient estimates
v. Structural analysis and margins
vi. Trajectory analysis, including drogue/main recontact analysis
vii. Fabrication techniques, plans, and schedule
viii Identify any remaining issues that need to be resolved prior to fabrication.
ixAny addition relevant information

1.2 Fabricate, Integrate & Deliver

Fabricate and deliver the following items in accordance with the designs generated in 1.1 above:

1.2.1 One (1) Ground Extraction Test Ringsail main parachute and deployment bag. This parachute will not be flown; however, it will be used in ground based extraction tests. — Apr. 30th, 2004

1.2.2 Four (4) Flight Articles. Each Flight Article shall include both a Ringsail main parachute with deployment bag and a drogue parachute. — First Flight Article: Jun. 25th, 2004 Remaining Flight Articles: Aug. 3rd, 2004

1.2.3 The contractor shall integrate the main parachute onto JPL supplied mating hardware prior to delivering the Flight Article to JPL.(as defined in the mechanical ICD).

1.3 Document

Prepare and deliver the following documents. These documents shall not include proprietary data:

1.3.1 Final Design Package — Jun. 25th, 2004

The Final Design Package shall contain all information necessary to fully specify the design including, but not limited to: a materials list, final as-built drawings, a mass breakdown of all components, and any specifications used in

the manufacture of the PDS.

1.3.2 Final Analysis Package
The Final Analysis Package shall contain documents fully describing the structural, aerodynamic, deployment and inflation, trajectory, recontact, and any other analysis performed on the final design. — Jun 25th, 2004

1.4 Test

1.4.1 Drogue testing
Perform a simple static load pull-test on the drogue parachutes as described in Exhibit I, section 3.3.2.3.

1.4.2 Ringsail main testing
All system level testing of the main parachute will be performed by JPL. The contractor shall provide engineering and integration support for these tests as follows:

1.4.2.1 1 person for 2 trips of three days each to the Naval Air Warfare Center at China Lake, CA to support ground extraction testing. — April 2004 – June 2004

1.4.2.2 1 person for 4 trips of three days each to Fort Sumner New Mexico to support the high altitude drop tests. — Sept. 2004 – Dec. 2004

1.5 Logistic Support

1.5.1 Tooling:

1.5.1.1 Ground Support Handling Equipment (GSHE)
The contractor shall be responsible for producing any special GSE fixtures needed to handle the packed main parachute. These fixtures shall be delivered with the parachute.

1.5.2 Training:
Contractor shall train JPL personnel in proper handling of the PDS.

1.6 Program Management

1.6.1 Provide JPL access to subcontractor fabrication, assembly, and test locations and permit JPL Quality Assurance or designated representatives to perform surveillance and in process inspection activities therein.

1.6.2 Provide, upon request, access to the Contractor's and subcontractor's data relating to technical matters directly pertaining to the work being performed under this Contract.

1.6.3 Notify the JPL Subcontract Manager and Contract Technical Manager (CTM):

1.6.3.1 At least five working days in advance of technical meetings in which JPL participation would be helpful to the Contractor.

1.6.3.2 At least five working days prior to the start of all major assembly acceptance tests at either the Contractor's or subcontractor's facilities.

1.6.3.3 If a significant problem, such as a schedule slippage, may occur. Work-around plans for these occurrences shall be developed and reviewed with JPL.

1.6.4 Product Assurance Program:
Implement the Product Assurance Plan/Procedures submitted with your proposal as restated in Exhibit II

1.6.5 Interface Configuration
Configuration shall be controlled by a Mechanical Interface Control Document (MICD), which shall be finalized and published by JPL on or before February 14, 2004.

1.6.6 Reviews and Meetings:

1.6.6.1 Kick-off Meeting: A kick-off meeting shall be held at the contractor's location to discuss plans for the contract. The kick-off meeting shall include presentation of a detailed work schedule that will accommodate the reviews and deliveries within this statement of work.	Within 5 business days of contract execution.
1.6.6.2 Pre-Ship Teleconference: This teleconference shall close out any actions generated at the CDR and ensure the parachutes are ready for shipment.	Jun. 8th, 2004
1.6.6.3 Weekly status teleconferences: The contractor shall participate in teleconferences every week to discuss management and technical issues. The contractors Project Manager shall attend, and include anyone pertinent to that meetings discussions.	Through Dec. 31st, 2004
1.6.6.4 High Altitude Test Readiness Review The contractor shall support the High Altitude Test Readiness Review, which will be held at JPL. The bulk of this review will be presented by JPL; however, there may be a section of this review given	Aug. 3rd, 2004

by the contractor to discuss the parachute.

1.7 Applicable Documents
The following Exhibits are hereby incorporated into and made a material part of the Contract:

1.7.1 Exhibit I, "MSL Focused Technology Task PDS Performance Specifications," dated October 11, 2003.

1.7.2 Exhibit II,Contractor's Product Assurance Plan/Procedures.

2.0 Delivery Requirements

2.1 Except as otherwise provided in this Subcontract, the point of inspection, acceptance and delivery of all supplies deliverable under this Subcontract shall be the Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, California 91109. All such supplies shall be packaged, packed, boxed, or crated in such a manner to ensure safe delivery and shall be shipped prepaid and at the Subcontractor's expense to the point of delivery.

2.2 Time is of the essence in the performance of this Subcontract

If New Technology is Applicable **DELETE IF NOT**

2.3 The Subcontractor shall furnish the cognizant JPL Negotiator with the annual and final reports of reportable items described in the Article entitled "New Technology." A copy of transmittal letters for those reports shall also be sent to the Intellectual Property Office (IPO).

Interim report every 12 months commencing on Date of Subcontract-Final Report within three months of completion of work

If Patent Rights is Applicable **DELETE IF NOT**

2.4 The Subcontractor shall provide the cognizant JPL Negotiator with the annual and final reports of subject inventions described in the Article entitled "Patent Rights - Retention by the Contractor (Short Form)." A copy of transmittal letters shall be sent to the Intellectual Property Office (IPO).

Interim report every 12 months commencing on Date of Subcontract-Final Report prior to Subcontract completion

2.5 Form JPL 1419, "DOD Industrial Plant Equipment Requisition"

At least 30 days prior to need for acquiring or fabricating item

2.6 NASA Form 1018 (or equivalent), "NASA Property in the Custody of Contractors"

2.6.1 Quarterly Submission commencing on date of Subcontract through completion

Reporting Period
Oct 1 thru Dec 31
Jan 1 thru Mar 31
Apr 1 thru June 30
Jul 1 thru Sept 30

Three (3) Business days after reporting period

2.6.2	Annual Submission commencing on date of Subcontract through completion	
	Reporting Period Oct 1 thru Sept 30	Fifteen (15) Business days after reporting period
2.6.3	Annual Verification of Government-Owned/Subcontractor-Held Property	30 days after receipt of list from JPL thru Subcontract Completion

3.0 JPL will:

3.1 Finalize and release the mechanical Interface Control Document on or before February 17, 2004.

3.2 Provide review boards for the PDR and CDR

3.3 Provide contractor with updates on test parameters for use in trajectory analysis

3.4 Approve any documents or drawings within ten working days of submission by contractor.

3.5 Be responsible for 1) extraction testing of the main parachute and 2) high altitude testing of the parachutes.

3.6 Supply the mounting plate to the contractor at least three weeks prior to expected parachute deliveries.

ARTICLE 2. PRICE AND PAYMENT

1.0 Total Fixed Price: ${TBD}. Progress payments will be allowed according to the terms set forth in the Additional General Provision entitled "Progress Payments - Small Business."

-OR-

2.0 Total Fixed Price: ${TBD}. Progress payments will be allowed according to the terms set forth in the Additional General Provision entitled "Progress Payments."

3.0 Invoices. Invoices shall be submitted, in triplicate, to JPL Supplier Payment Section, M/S 601-208, 4800 Oak Grove Drive, Pasadena, California 91109.

The Subcontractor shall attach to each invoice, submitted in accordance with the General Provision of this Subcontract entitled "Payments and Discounts," a fully completed "Contractor's Request for Progress Payment," Standard Form 1443, or equivalent.

Detailed billing instructions and samples that will ensure the correct processing of your invoices can be found at the following link:
http://acquisition.jpl.nasa.gov/pdf/FP_Billing.pdf

ARTICLE 3 SPECIAL PROVISIONS

1.0 Data Removal from Computers.

1.1 The Contractor shall completely overwrite or degauss the media containing all data (which can include sensitive, Privacy Act, proprietary, and mission critical data) from hard drives and other computer storage devices and remove licensed software from Government-owned computers before such computers leave the control of the Contractor organization by transfer or disposal. JPL data shall also be removed from Contractor-owned computers when the computer will be no longer used for this Contract. The Contractor shall archive all data required to be retained, pursuant to the "Rights in Data - General" Article. Guidance on what constitutes mission-critical data and sensitive information (such as business and restricted technology information and scientific, engineering, and research information) is contained in NASA Procedure and Guidelines for Security of Information Technology (NPG) 2810, available on the worldwide web or from the JPL Negotiator. Proprietary data consists of trade secrets and other commercial or financial information confidential to the individual owner or organization. Proprietary data is normally labeled as such. Trade secrets or commercial or financial information that has been released to the public or is otherwise in the possession of persons other than the individual owner or organization is in the public domain and may no longer be entitled to proprietary protection.

1.2 The Contractor shall submit to JPL a written certification that media containing all JPL data has been overwritten or degaussed from computers when returned to JPL or disposed of.

2.0 Key Personnel and Facilities.

2.1 The personnel and/or facilities, if any, specified below in paragraph (*) are considered essential to the work being performed hereunder. Prior to removing, replacing, or diverting any of the specified individuals or facilities, the Contractor shall notify JPL reasonably in advance and shall submit justification (including proposed substitutions) in sufficient detail to permit evaluation of the impact on this Contract. No diversion shall be made by the Contractor without the written consent of JPL; provided, that JPL may ratify in writing the change, and such ratification shall constitute the consent of JPL required by this Article. Paragraph (b) below may, with the consent of the Contracting parties, be amended from time to time during the course of the Contract to either add or delete personnel and/or facilities, as appropriate.

2.2 The following Contractor personnel shall be considered Key Personnel under this Contract:

(*Name and Percent Time)

3.0 Assignment, Novation and Transfer

3.1 This subcontract or purchase order may be assigned, novated, or transferred to a successor-in-interest, a successor contractor to operate the Jet Propulsion Laboratory, or the Government.

IN WITNESS WHEREOF, the parties hereto have executed this Subcontract as of the day and year first above written.

CALIFORNIA INSTITUTE OF TECHNOLOGY

CALIFORNIA INSTITUTE OF TECHNOLOGY

By _____
Type Name Here

_____
(Title)

{TYPE NAME OF SUBCONTRACTOR HERE}

By _____
(Signature)

_____
(Typed Name)

_____
(Title)

Instructions to Subcontractor: Do not insert date on Preamble page.